

CLAIMS

What is claimed is:

1. A headset for providing selective acoustical isolation to the wearer, comprising:
 - 5 (a) an earpiece capable of being positioned proximal the ear of a person wearing said apparatus;
 - (b) an audio conversion device within the earpiece that is positioned so as to be acoustically coupled to the ear canal of said wearer, said audio conversion device configured to receive electrical energy and convert it to sound;
 - 10 (c) a microphone attached to said earpiece and configured to register the energy of sounds which occur external to the earpiece and to convert the sound energy to an external sound signal;
 - (d) a selection device attached to said headset capable of being activated by the headset wearer; and
 - 15 (e) a signal conditioning circuit configured to sufficiently amplify and couple the external sound signal to the audio conversion device in response to activation of the selection device such that the headset enters a hearthrough mode which improves the ability of the wearer to hear external sounds.
- 20 2. A headset as recited in claim 1, further comprising a timing mechanism within the headset that automatically deactivates the selection device a predetermined period of time after activation.

3. A headset as recited in claim 1, wherein the selection device comprises a switch activated by contact by the wearer.

5 4. A headset as recited in claim 1, wherein the headset is configured to receive input signals which are coupled to the audio conversion device, such that the wearer may listen to programming such as music and audio communications that are received within the input signals.

10 5. A headset as recited in claim 4, wherein the signal conditioning circuit is further configured to attenuate the input signals upon the activation of the selection device so as to improve the ability of the wearer to hear the external environment.

15 6. A headset as recited in claim 5, wherein the level of attenuation comprises a muting of the input source by at least 20 dB.

7. A headset as recited in claim 1, wherein the signal conditioning circuit comprises a signal processing unit which is further configured to compare the sounds registered by the microphone against a set of stored sound selection criterion, whereupon while the selection device remains inactive and in response to the signal processing circuit discerning a sufficient level of sound matching it conditions and couples the sound registered by the microphone to the audio conversion device within

the earpiece such that the ability of the wearer to hear external sounds is responsive to the detection of selected sounds.

8. An apparatus for providing selective acoustical isolation to the wearer,

5 comprising:

- (a) an earpiece configured for positioning proximal the ear of a person wearing said apparatus and as a result providing a given number of decibels of acoustical isolation from the external environment;
- (b) an audio conversion device within the earpiece that is positioned so as to be acoustically coupled to an ear canal of said wearer, said audio conversion device configured to receive an electrical signal which is converted to sound;
- (c) a microphone attached to said earpiece that is configured to register the acoustical energy of external environmental sounds which are converted to an external sound signal; and
- (d) a signal processing circuit configured to receive the external sound signal from said microphone which is compared against a set of programmed sound selection criterion, whereupon the amount of acoustic isolation provided by the apparatus is changed in response to a sufficient level of sound matching thereof.

20 9. An apparatus as recited in claim 8, wherein the change in the amount of acoustic isolation occurs for a sufficient period of time to alert the wearer of conditions in the external environment.

10. A headset as recited in claim 8, further comprising a manually operated selection device mounted on the apparatus which upon activation triggers a reduction in the amount of acoustical isolation provided by the apparatus.

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11. An apparatus as recited in claim 8, wherein said audio conversion device is configured for receipt and conversion of a received program signal, such as music or communications, to audio for listening by the wearer.

10 12. An apparatus as recited in claim 8, wherein the signal processing circuit is configured to record sound characterizations as programmed sound selection criterion upon user activation of characterization recording in approximate temporal synchronization with sounds from the external environment whose sound characteristics are to be programmed.

15 13. An apparatus as recited in claim 8, wherein the signal processing circuit is configured to allow the user to select programmed sound selection criterion from a preprogrammed set of sound selection criterion.

20 14. An apparatus as recited in claim 8, wherein the set of programmed sounds comprise characterization information about sounds, referred to as hearthrough sounds, which the listener should be alerted to in response to their occurrence within the

external environment, wherein in response to a sufficient level of sound matching between the sounds from the external environment and the hearthrough sounds the acoustical isolation of the apparatus is decreased by applying the external sound signal registered by the microphone to the audio conversion device to reproduce external
5 sounds within the earpiece.

15. An apparatus as recited in claim 14, wherein said audio conversion device is configured for receipt and conversion of a received program signal, such as music or communications, with said program signal being attenuated in response to sufficient
10 matching of the hearthrough sound with sounds registered from the external environment such that the ability of the wearer to listen to the external environment is improved.

16. An apparatus as recited in claim 8, wherein the signal processing circuit is further configured to generate an alerting signal to the audio conversion device to signal
15 the wearer that a sufficient sound match has occurred.

17. An apparatus as recited in claim 8, wherein the signal processing circuit is configured with noise cancelation circuitry to enhance the earpiece acoustical isolation
20 by modifying the output from the audio conversion device with a negative feedback, opposing phase, signal based on sounds registered by the microphone.

18. An apparatus as recited in claim 17, wherein the set of programmed sounds comprise characterization information about sounds, referred to as hearthrough sounds, which the listener should be alerted to in response to their occurrence within the external environment, and wherein the signal processing circuit is configured to
5 reduce the acoustic isolation provided by the noise cancelation circuitry after a hearthrough sound is sufficient matched with a sound from the external environment so as to improve the ability of the wearer to hear the external environment.

19. An apparatus as recited in claim 17, wherein the noise cancelation circuitry is configured to selectively increase acoustical isolation provided by the headset of sound characterization elements contained within the set of programmed sound selection criterion that specify sounds which are to be blocked from the external environment, referred to as a blocked sound, wherein the noise cancelation circuitry specifically enhances its active attenuation of blocked sounds as received from the
15 external environment.

20. A method of providing selective acoustic isolation of a headset wearer from the external acoustic environment, comprising the steps of:
(a) acoustic monitoring of the external environment so that the acoustics are registered by a microphone and converted to electrical signals received by a signal processing circuit;
20 (b) comparison of the monitored acoustics from the microphones by the signal

- processing circuit with a stored set of acoustic sound parameters; and
- (c) converting the monitored acoustics registered by the microphones into acoustic energy within the headset in response to matches of the monitored acoustics with elements in the stored set of acoustic sound parameters such that the wearer of
- 5 the headset is made aware of selected external acoustics which are associated to the set of stored acoustic parameters.